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NORTH AMERICA INTELLECTUAL PROPERTY CORPORATION			EXAMINER	
P.O. BOX 506			FLORES, LEON	
MERRIFIELD, VA 22116			ART UNIT	PAPER NUMBER
			2611	
			NOTIFICATION DATE	DELIVERY MODE
			11/29/2007	ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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# Office Action Summary

Application No.

10/707,822

Applicant(s)

WANG ET AL.

Examiner

Leon Flores

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

1) ☒ Responsive to communication(s) filed on 23 October 2007.

2a) ☐ This action is **FINAL**.

2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

4) ☒ Claim(s) 1-15 is/are pending in the application.

4a) Of the above claim(s) 3, 6, 8 and 11 is/are withdrawn from consideration.

5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.

6) ☒ Claim(s) 1, 2, 4, 5, 7, 9, 10 and 12-15 is/are rejected.

7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.

8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☒ The drawing(s) filed on 14 January 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) ☒ All b) ☐ Some \* c) ☐ None of:

1. ☒ Certified copies of the priority documents have been received.

2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.

3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08)

Paper No(s)/Mail Date \_\_\_\_\_.

4) ☐ Interview Summary (PTO-413)

Paper No(s)/Mail Date. \_\_\_\_\_.

5) ☐ Notice of Informal Patent Application

6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Response to Arguments*

1. Applicant's arguments with respect to claims (1-2, 4-5, 7, 9-10, 12-15) have been considered but are moot in view of the new ground(s) of rejection.

### *Claim Rejections - 35 USC § 103*

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. **Claims (1-2) are rejected under 35 U.S.C. 103(a) as being unpatentable over Rahman. (US Publication 2003/0174641 A1).**

Re claim 1, Rahman discloses a method for reducing phase mismatch in quadrature signals in an RF receiver, wherein the quadrature signals comprises a first signal and a second signal that are at about quadrature phase angles, the method comprises: modifying the second signal by the portion of the first signal so that a phase

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difference between the modified second signal and the first signal becomes substantially close to 90 degrees. (See fig. 5: 146 & paragraph 35 "IQ phase imbalance correction loop")

But the reference of Rahman fails to explicitly teach subtracting a portion of the first signal from the first signal.

However, the reference of Rahman does suggest the teaching of trigonometric identities in order to compensate IQ imbalances. If you focus your attention on this equation, ".5\*sin(A+e) + .5\*sin(A-e)" , one can clearly see that the second portion of this trigonometric identity, which represents the in-phase component, has a negative e being subtracted from A. (See fig 5 & paragraphs 35-39, including equations) Furthermore, one of ordinary skills would know how to make and use of these mathematical equations in an IQ phasor plane in order to achieve orthogonality.

Therefore, it would have been obvious to one of ordinary skills in the art to have incorporated this feature into the system of Rahman, in the manner as claimed, for the benefit of achieving I/Q phase imbalance compensation. (See paragraph 35)

Re claim 2, the reference of Rahman further discloses compensating the portion of the first signal to the second signal to reduce phase mismatch in the pair of quadrature signals. (See fig. 5 & paragraphs 35-39)

5. **Claims (4-5) are rejected under 35 U.S.C. 103(a) as being unpatentable over Wynn (US Patent 6,009,317), in view of Rahman. (US Publication 2003/0174641 A1), and further in view of Jeong (US Publication 2003/0095589 A1).**

Re claim 4, Wynn discloses a method used in an RF receiver for reducing an image cross talk, the RF receiver comprising: a first mixer and a second mixer for receiving RF signals and respectively generating a first signal and a second signal that are at about quadrature phase angles; and a programmable phase calibration device coupled to the pair of mixers for reducing phase mismatch in the pair of quadrature signals when the phase mismatch causes the image cross talk; the method comprising: utilizing the pair of mixers to process the RF signal and to output the pair of quadrature signals. (See fig. 3: 74 & 76)

But the reference of Wynn fails to specifically disclose utilizing the programmable phase calibration device to reduce the phase mismatch in the pair of quadrature signals through subtracting a portion of the first signal from the first signal and modifying the second signal by a portion of the first signal.

However, Rahman does. (See fig. 5 & paragraphs 35-39, including equations) The reference of Rahman does suggest the use of trigonometric identities in order to compensate IQ imbalances. If you focus your attention on this equation, " $.5*\sin(A+e) + .5*\sin(A-e)$ ", one can clearly see that the second portion of this trigonometric identity, which represents the in-phase component, has a negative  $e$  being subtracted from  $A$ . Furthermore, one of ordinary skills would know how to make and use of these mathematical equations in an IQ phasor plane in order to achieve orthogonality.

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Therefore, taking the combined teachings of Wynn and Rahman as a whole. It would have been obvious to one of ordinary skills in the art to have incorporated this feature into the system of Wynn, in the manner as claimed and as taught by Rahman, for the benefit of providing imbalance compensation.

The combination of Wynn and Rahman discloses the limitations as claimed above, except they do not specifically disclose that wherein two ports of the programmable phase calibration device are respectively connected to two output ports of the pair of mixers.

However, Jeong does. (See fig. 1: elements 114 & 104 as a whole) Jeong discloses an apparatus for estimating and correcting gain and phase imbalance in a CDMA system. Gain and phase imbalance correction takes place after the incoming signal has been converted from RF to baseband and digitized. Furthermore, one skilled in the art would know that direct conversion receiver is achieved by downconverting or mixing the RF signal with a local oscillator.

Therefore, taking the combined teachings of Wynn, Rahman and Jeong as a whole, it would have been obvious to one of ordinary skill in the art to have modified the system of Wynn, as modified by Rahman, in the manner as claimed and as taught by Jeong, for the benefit of detecting and correcting gain and phase imbalances.

Re claim 5, the combination of Wynn, Rahman, and Jeong further discloses utilizing the programmable phase calibration device to compensate the portion of the first signal to the second signal so that phase difference between the compensated



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second signal and the first signal becomes 90 degrees. (In Rahman, see fig. 5: 146 & paragraph 35 "I/Q phase imbalance correction loop")

**6. Claims (7, 9-10, 13) are rejected under 35 U.S.C. 103(a) as being unpatentable over Wynn (US Patent 6,009,317), and in view of Rahman. (US Publication 2003/0174641 A1)**

Re claim 7, Wynn discloses an RF receiver comprising: a first mixer and a second mixer for receiving RF signals and respectively generating a first signal and a second signal that are at about quadrature phase angles (See fig. 3: 74 & 76); and a phase calibration module coupled to at least one of the first mixer and the second mixer. (See fig. 3: 79 & col. 6, lines 55-65)

But the reference of Wynn fails to specifically disclose for subtracting a portion of the first signal from the first signal and combining the portion of the first signal with the second signal so as to make the phase difference of the first signal and the second signal substantially equal to 90 degrees.

However, Rahman does. (See fig 5 & paragraphs 35-39, including equations) The reference of Rahman does suggest the teaching of trigonometric identities in order to compensate IQ imbalances. If you focus your attention on this equation, " $.5*\sin(A+e) + .5*\sin(A-e)$ ", one can clearly see that the second portion of this trigonometric identity, which represents the in-phase component, has a negative e being subtracted from A. Furthermore, one of ordinary skills would know how to make and use of these mathematical equations in an IQ phasor plane in order to achieve orthogonality.

Therefore, taking the combined teachings of Wynn and Rahman as a whole. It would have been obvious to one of ordinary skills in the art to have incorporated this feature into the system of Wynn, in the manner as claimed and as taught by Rahman, for the benefit of providing imbalance compensation.

Re claim 9, the combination of Wynn and Rahman further discloses that wherein the phase calibration module further comprises a phase calibration device coupled between the first mixer and the second mixer. (In Wynn, see fig. 3: element 79)

Re claim 10, the combination of Wynn and Rahman further discloses an analog front end controller (AFE controller) coupled to and controlling the phase calibration module so as to make the phase difference of the first signal and the second signal substantially equal to 90 degrees. (In Wynn, see fig. 3: element 62. Furthermore, processor acts as a controller in that it controls and balances the imbalances associated with the quadrature signals.)

Re claim 13, the combination of Wynn and Rahman further discloses a GSM communications system or a WLAN communications system. (In Wynn, see col. 1, line 62, where it discloses a RF receiver.)

**7. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wynn (US Patent 6,009,317) and Rahman. (US Publication 2003/0174641 A1), as**



**applied to claim 7 above, and further in view of Zheng. (US Publication 2004/0002323 A1)**

Re claim 14, the combination of Wynn and Rahman fails to disclose a complex filter, having input ports electrically connected to the phase calibration module, for processing image cross talk caused by mismatch between the first signal and the second signal.

However, Zheng does. (See fig. 1: 20 & 50 & paragraphs 40-44) Zheng discloses a complex filter (20), having input ports electrically connected to the phase calibration module (50), for processing image cross talk caused by mismatch between the first signal and the second signal. (Paragraph 44)

Therefore, taking the combined teachings of Wynn, Rahman, and Zheng as a whole. It would have been obvious to one of ordinary skills in the art to have incorporated this feature into the system of Wynn, as modified by Rahman, in the manner as claimed and as taught by Zheng, for the benefit of providing imbalance compensation. (See paragraph 44)

**8. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wynn (US Patent 6,009,317) and in view of Zheng. (US Publication 2004/0002323 A1)**

Re claim 15, Wynn discloses an RF receiver comprising: a first mixer and a second mixer for receiving RF signals and respectively generating a first signal and a second signal that are at about quadrature phase angles (See fig. 3: 74 & 76); an

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amplitude calibration module coupled to at least one of the first mixer and the second mixer, for adjusting the amplitude of at least one of the first signal and the second signal so as to make the amplitude of the first signal and the second signal substantially equal. (See fig. 3: 86 & 88 & col. 7, lines 24-50)

But the reference of Wynn fails to teach a complex filter; having input ports electrically connected to the amplitude calibration module, for processing image cross talk caused by mismatch between the first signal and the second signal.

However, Zheng does. (See fig. 1: 20 & 50 & paragraphs 40-44) Zheng discloses a complex filter (20), having input ports electrically connected to the amplitude calibration module (50), for processing image cross talk caused by mismatch between the first signal and the second signal. (Paragraph 44)

Therefore, taking the combined teachings of Wynn, Rahman, and Zheng as a whole. It would have been obvious to one of ordinary skills in the art to have incorporated this feature into the system of Wynn, as modified by Rahman, in the manner as claimed and as taught by Zheng, for the benefit of providing imbalance compensation. (See paragraph 44)

**9. Claims (4-5) are rejected under 35 U.S.C. 103(a) as being unpatentable over Zheng. (US Publication 2004/0002323 A1), and in view of Rahman. (US Publication 2003/0174641 A1)**

10. Re claim 4, Zheng discloses a method used in an RF receiver for reducing an image cross talk, the RF receiver comprising: a first mixer and a second mixer for

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receiving RF signals and respectively generating a first signal and a second signal that are at about quadrature phase angles (See fig. 1: 10a & 10b); and a programmable phase calibration device coupled to the pair of mixers for reducing phase mismatch in the pair of quadrature signals when the phase mismatch causes the image cross talk (See fig. 1: 50 & paragraph 32 & 40-44); the method comprising: utilizing the pair of mixers to process the RF signal and to output the pair of quadrature signals. (See fig. 1: 10a & 10b), wherein two ports of the programmable phase calibration device are respectively connected to two output ports of the pair of mixers. (See fig. 1: 10a, 10b, 50, and paragraph 30)

But the reference of Zheng fails to specifically disclose utilizing the programmable phase calibration device to reduce the phase mismatch in the pair of quadrature signals through subtracting a portion of the first signal from the first signal and modifying the second signal by a portion of the first signal.

However, Rahman does. (See fig. 5 & paragraphs 35-39, including equations) The reference of Rahman does suggest the use of trigonometric identities in order to compensate IQ imbalances. If you focus your attention on this equation, ".5\*sin(A+e) + .5\*sin(A-e)", one can clearly see that the second portion of this trigonometric identity, which represents the in-phase component, has a negative e being subtracted from A. Furthermore, one of ordinary skills would know how to make and use of these mathematical equations in an IQ phasor plane in order to achieve orthogonality.

Therefore, taking the combined teachings of Zheng and Rahman as a whole. It would have been obvious to one of ordinary skills in the art to have incorporated this

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feature into the system of Zheng, in the manner as claimed and as taught by Rahman, for the benefit of providing imbalance compensation.

Re claim 5, the combination of Zheng and Rahman further discloses utilizing the programmable phase calibration device to compensate the portion of the first signal to the second signal so that phase difference between the compensated second signal and the first signal becomes 90 degrees. (In Rahman, see fig. 5: 146 & paragraph 35 "I/Q phase imbalance correction loop")

### ***Claim Rejections - 35 USC § 102***

11. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

12. **Claim 15 is rejected under 35 U.S.C. 102(e) as being anticipated by Zheng.**

**(US Publication 2004/0002323 A1)**

Re claim 15, Zheng discloses an RF receiver comprising: a first mixer and a second mixer for receiving RF signals and respectively generating a first signal and a second signal that are at about quadrature phase angles (See fig. 1: 10a & 10b & paragraph 30); an amplitude calibration module coupled to at least one of the first mixer

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and the second mixer, for adjusting the amplitude of at least one of the first signal and the second signal so as to make the amplitude of the first signal and the second signal substantially equal (See fig. 1: 50 & paragraphs 32 & 40-44), and a complex filter; having input ports electrically connected to the amplitude calibration module, for processing image cross talk caused by mismatch between the first signal and the second signal. (See fig. 1: 20, 50 & paragraph 44)

### ***Contact***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Leon Flores whose telephone number is 571-270-1201. The examiner can normally be reached on Mon-Fri 7-5pm Alternate Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Payne can be reached on 571-272-3024. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a

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USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

LF

November 9, 2007

  
DAVID C. PAYNE  
SUPERVISORY PATENT EXAMINER